

Kiddy Pool

Reporting Category Measurement

Topic Measuring liquid volume

Primary SOL 4.8 The student will

- a) estimate and measure liquid volume and describe the results in U.S. Customary units; and
- b) identify equivalent measurements between units within the U.S. Customary system (cups, pints, quarts, and gallons).

Related SOL 4.7a

Materials

- A small, hard-plastic, rectangular swimming pool
- Notebooks or journals for recording estimates and actual measurements
- Pencils, crayons, markers
- A variety of measuring devices, including pint, quart, and gallon containers; measuring cups; tape measures; yard sticks; string; and other measurement tools suggested by students

Vocabulary

estimate, cup, pint, quart, gallon, U.S. Customary units of measure, liquid volume

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

Note: This activity must be done only after it has rained significantly the previous night.

(Alternatively, you could put water in the pool before the students arrive at school and tell them to pretend that an unexpected shower happened during the previous night.)

1. Present the following word problem to the class: “Mrs. Smith has placed a small, rectangular, plastic swimming pool in the school yard so that rainwater will collect in it. The rainwater is used in the classroom to water the plants in the science area. There has been a lot of discussion among the students about how much water collects in the pool during a rain shower. So, Mrs. Smith has decided that the class will measure the rainwater to get an accurate account. Prior to this activity, Mrs. Smith measured the amount of water in the pool so that she could compare her data with that of the students when the activity is complete. How can the students measure the amount of water in the pool?”
2. Tell the students that they are going to conduct a measuring experiment to find out how much water fell in the pool during the rain storm last night. Discuss the ways to determine how much water is in the pool. Ask them to write in their journals what they would do to measure the water and to include “estimates” of how much water they think is in the pool. Have them describe the tools they will use to measure the amount of water in the pool and why those tools are appropriate for measurement of the water. Ask them to draw pictures in their journals of the procedures that would follow. Have students explain their estimates.

3. Review the U.S. Customary tools for measurement of liquid volume and equivalent units among cups, pints, quarts, and gallons.
4. Discuss what dimensions the students will measure (e.g., depth of the water, length and width of the pool, depth of the pool). Ask whether the final measurement will be accurate, and discuss what kinds of things might keep the measurement from being accurate (e.g., spillage, evaporation, debris in the pool, inaccurate measuring).
5. Divide the class into cooperative learning groups of four students each. Tell students that each group may use the measuring devices of their choice, but that there must be consensus within the group about what is to be used. For instance, one group may decide to use U.S. Customary measuring cups, while another group may want to use a nonstandard measuring device. Allow for creativity, but encourage students to be realistic about their measurement tools. For example, if one group insists on using a measuring spoon, dissuade them because this is not a realistic tool for measuring such a large amount of water.
6. After each group has chosen a measuring tool, have each group record an estimate of the amount of water in the pool.
7. Then, have each group, in turn, conduct the measurement, record it, and pour the water back into the pool, if they removed it. Later, discuss how the pouring may affect the accuracy of the measurement.
8. As each group completes the measurement, ask them to share it with the class. Have students include additional comments in their journals, answering the following questions: “Did the measurement go as you had expected? Did anything unusual happen?”
9. Compare the groups’ measurements of the amount of water. Discuss whether or not the totals are the same. Discuss whether they should be the same and, if not, why. This is an open-ended activity, but it allows students to see that measurements may be conducted in a variety of ways. Finally, reveal the actual measurement of the original amount of water, and compare this measurement to those of the groups. Compare students’ choices of measuring tools to the amount of water measured. How many cups were collected by one group and how many quarts by another?

Assessment

- **Questions**

- How much more water in addition to the original amount do you think this Kiddie Pool will hold?
- What other containers can you think of that may hold about the same amount of water?
- What types of containers might be most efficient for collecting and measuring rainwater? (wide-mouth graduated containers)

- **Journal/Writing Prompts**

- Explain why your group chose the tool used to measure the amount of water in the pool. Discuss whether you think you choose the right tool and explain your reasoning. Would you choose a different tool?
- Record any observations your group made when measuring the water in the pool. Were your measurements accurate? Explain your reasoning.

Extensions and Connections (for all students)

- Ask the students to brainstorm additional unusual “bodies of water” that could be measured but typically are not (e.g., puddles in the school yard, water in a bathtub, water in a birdbath, water in an aquarium).

Strategies for Differentiation

- Allow students to type responses rather than write in a journal.
- Limit the measuring tools to reasonable choices for this activity.
- Participate in the measuring process with students to ensure they are making appropriate and reasonable measurements.
- Assign tasks in small groups according to abilities.